
ENVIRONMENTAL Fact Sheet



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Tetrahydrofuran: Health Information Summary

Tetrahydrofuran (THF) is a colorless, flammable liquid with an ether-like odor, which is used in industry primarily as a solvent for various polymers and resins. It is also used in rubber production, cellophane, adhesives, magnetic tapes and printing inks. Because THF is a component of food packaging adhesives, it can be an indirect food additive. THF is also in adhesives used to join plastic pipe for well construction and water treatment systems. Therefore, water samples collected after recent repair of water supply piping may detect THF leaching from this source. Concentrated THF is capable of forming peroxides and becoming explosive.

THF released to the atmosphere is expected to degrade rapidly. THF spilled onto the soil will easily evaporate, but also migrates readily through the soil into groundwater.

Health Effects

Absorption

Studies indicate that THF is absorbed orally, by inhalation and dermally. Human and animal studies suggest that THF is rapidly eliminated by the body and does not build up in tissues except under continuous and high exposure conditions.

Short-Term (Acute) Effects

Exposure to concentrated THF in the workplace has caused dermatitis and exposure to high levels from inhalation has been found to be irritating to the eyes, and nose and throat. The estimated fatal oral dose in an adult human ranges from 3,500 to 35,000 milligrams (mg). Inhalation of vapors in amounts much greater than usually found in environmental contamination affects the central nervous system (CNS), which can result in headache, dizziness and fatigue. Animal studies confirm the effects seen in humans.

Long-Term (Chronic) Effects

There are no epidemiological studies with which to determine the effects of chronic human exposure to THF. However, in case studies of individual workers exposed by inhalation to THF, liver, kidney, CNS and respiratory effects were observed. Both oral and inhalation exposures to high THF levels in animal studies reported liver, lung, and kidney damage. Changes in blood chemistry were also noted in several animal studies.

Carcinogenic (Cancer-Causing) Effects

There are no long-term studies of human exposure to determine whether THF is carcinogenic. In a two-year inhalation study, THF exposure resulted in increases in kidney tumors in male rats and liver tumors in female mice. Another animal study for carcinogenicity indicated no tumor causing effects after application of THF to the skin of mice. THF has not been officially evaluated by the US Environmental Protection Agency for its cancer potential. Based on the one study showing kidney and liver tumor increases in rodents, THF would likely be put into the “suggested evidence of cancer potential” classification under the current EPA cancer guidelines.

Teratogenic/Reproductive Effects

In an animal study in which rats were exposed to THF in drinking water, decreased body weights and developmental delays were seen in offspring.

Health Standards and Criteria

The Occupational Safety and Health Administration (OSHA) standard (permissible exposure limit or PEL) for THF in workplace air is 200 ppm averaged over eight hours of exposure.

Using EPA data, the Department of Environmental Services has derived a drinking water guideline for THF of 154 micrograms per liter (equal to parts per billion). At or below this level, we would not expect adverse health effects to occur as a result of water usage, assuming consumption of two liters of water per day for 70 years by a 70 kilogram (154 lb) adult. Additionally, the drinking water guideline is only 20 percent of the total acceptable exposure to THF to allow for potential exposure contributions from other sources.

Suggested Reading and References

Casarett and Doull's Toxicology: The Basic Science of Poisons, Sixth Edition. Klaassen, C.D., ed. McGraw-Hill Publishing Co., Inc., New York, 2001.

Toxicological information on tetrahydrofuran. Compiled on the Hazardous Substance Data Bank (HSDB). National Library of Medicine. Bethesda, MD. Address: <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>.

Re-evaluation of human-toxicological maximum permissible risk levels. National Institute of Public Health and the Environment. RIVM report 711701025. The Netherlands. March 2001. Address: <http://www.rivm.nl/bibliotheek/rapporten/711701025.html>.